① Solve using the change of base: $\log_5 10$

$\log_{10}$ $\log_e$

$$\frac{\log_e 10}{\log_e 5} = \frac{\ln 10}{\ln 5}$$

$$\frac{\log_{10} 10}{\log_{10} 5} = \frac{\log 10}{\log 5}$$

↳ 1.43

② Solve for x. $10^{3x} + 4 = 9$

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$-4 \quad -4$

$10^{3x} = 5$

$\log 5$

$\log_{10} 5 = 3x$

$\frac{\log_{10} 5}{\log_{10} 10} = 3x$

$.698 = 3x$

$\frac{.698}{3} = \frac{3x}{3}$

$x = .233$

If $\log_b x = \log_b y$, then $x = y$

Ex $\log_3 x = \log_3 5$ $x = 5$

Ex1 $\log_5(4x-7) = \log_5(x+5)$

$4x-7 = x+5$

$-5 \quad -5$

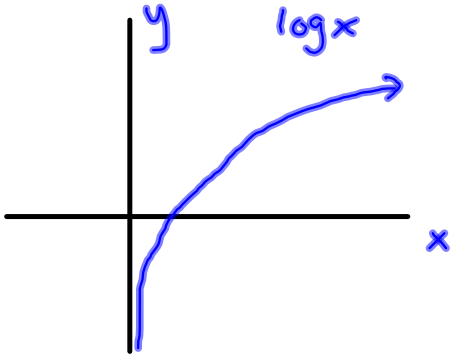
$4x-12 = x$

$-4x \quad -4x$

$-12 = 3x$

$-3 \quad -3$

$x = 4$



* when you plug x back in, the inside of the log cannot be negative!!

$$\log_3(x^2+1) = \log_3(2x)$$

$$x^2+1 = 2x$$
$$-2x \quad -2x$$

Solve by factoring.

$$x^2-2x+1=0$$
$$(x-1)(x-1)=0$$
$$x=1$$

Hint: use the product property....

$$\log 2x + \log(x-5) = 2$$

$$(\log m + \log n = \log m \cdot n)$$

$$\log(2x(x-5)) = 2$$

$$\log_{10}(2x^2 - 10x) = 2$$

changed to exponential form

$$10^2 = 2x^2 - 10x$$

$$100 = 2x^2 - 10x$$

$$-100 \qquad\qquad -100$$

$$\frac{0}{2} = \frac{2x^2 - 10x - 100}{2}$$

$$0 = x^2 - 5x - 50 \qquad \text{Factor}$$

$$0 = (x-10)(x+5)$$

$x = 10, -5$ → makes a negative. extraneous

$$\log 2x + \log(x-5) = 2$$

* Check in log !!

$$\log 2(-5)$$

$$\log \neq 10$$